



Closeout Report 2013 DOE HEP National Laboratory Intensity Frontier Research Review

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- **Panelists:** Myron Campbell (Michigan), Kay Kinoshita (Cincinnati), Danny Marfatia (Kansas), Glen Marshall (TRIUMF), Clark McGrew (Stony Brook), Donna Naples (Pittsburgh), Ornella Palamara (INFN-Gran Sasso), Frank Porter (Caltech), Heather Ray (Florida), Stefan Ritt (PSI), Mike Shaevitz (Columbia), Fumihiko Suekane (Tohoku), Jon Urheim (Indiana), Eric Zimmerman (Colorado), Scott Menary (York).
- **DOE-HEP:** Alan Stone (Review Chairman, Program Manager, Intensity Frontier), Tim Bolton (Program Manager, Intensity Frontier), Jim Siegrist (Associate Director for HEP), Glen Crawford (Director, Research and Technology Division, HEP), Mike Procario (Director, Facilities Division, DOE). 10 HEP Program Managers. Support staff Christie Ashton and Kathy Yarmas.
- **NSF:** Saul Gonzales, Randy Ruchti.
- **Laboratories:** ANL, BNL, FNAL, LANL, LBNL, LLNL, PNNL, SLAC



Some Comments

Thank you for making this a successful review. We sincerely appreciate:

- **The full cooperation and timely responses from all of the national laboratories.**
 - This is the first review with more than 6 participating labs!
- **The panel for travelling far and wide for this review, reading voluminous material and preparing summary reports.**
- **High quality of the laboratory materials, deep level of engagement of the panel.**

This is a complex, growing and challenging research program.

It can only succeed if all parties work towards producing the best science in the world.



Review Process

- **This is the 2nd cycle of a new kind of review for HEP**
 - New HEP management model implemented in 2008
 - Old model: manage by institution (lab, university)
 - New model: manage by physics thrust
 - Initiated a series of reviews to implement new management model
 - Re-diagonalized review structure in 2012 to mirror new HEP budget basis
- **Triennial comparative reviews of lab research programs:**
 - 2008, 2011: Theory, (Accelerator Science)
 - 2009, 2012: Detector R&D, Proton-Accelerator-based → Energy Frontier
 - 2010, 2013: Electron Accelerator-based, Non-Accelerator
 - → Intensity Frontier, Cosmic Frontier
 - 2014+ : Repeat
- **General concept is to make lab and university reviews as similar and as transparent as possible**
- **Has evolved as we learn pros and cons of this format**



- **Current out year budgets project declining level-of-effort in overall Research program**
 - This is part of HEP strategy to build new projects within overall flat or declining budgets
 - Intensity Frontier research has been largely protected in order to grow this program (although actual growth has been modest)
 - May be adjusted depending on review outcomes, HEPAP/P5 input
 - In general, increasing investment in one research thrust (or developing a new one) will require reducing another



Review Charge

- **For each individual lab research group, we request a specific evaluation of:**
 - The quality and impact of the research by the group in the recent past;
 - The scientific significance, merit, and feasibility of the proposed research;
 - The competence and future promise of the group for carrying out the proposed research;
 - The adequacy of resources for carrying out the proposed research, and cost-effectiveness of the research investment;
 - The quality of the support and infrastructure provided by the laboratory;
 - The effectiveness in enabling the broader community to perform world class intensity frontier research; and
 - The demonstration of leadership in the intensity frontier.
- **We request a comparative assessment of each lab's overall performance in these areas relative to its peers, as well as an assessment of overall and per capita effectiveness.**



Guidance to Panel

- We would like clear findings on the relative strengths and weaknesses of:
 - Individual lab research groups
 - Overall research thrusts within OHEP program
- Comments (as needed) to improve the overall quality and productivity of the program
 - Usefulness of comments generally scales as $1/N$
 - *Really important* comments can rise to the level of Recommendations in Overall Summary
- We will use your findings and comments as key inputs in making decisions about which thrusts to pursue, and on what timescale.



Deliverables to Lab

- **Provide the labs immediate feedback on Thursday.**
 - 1-3 slides in the form of Findings, Comments, Recommendations
- **Prepare an overall report for the Office of High Energy Physics that, with the lab summary reports, will be used to help DOE HEP manage US Intensity Frontier research for the next three years.**
 - Report is due to Glen Crawford by July 15th
- **Prepare summary reports for each of the laboratories. These will be used to help each lab manage its Intensity Frontier research program for the next three years. The labs will be required to respond to the reports in a timely way.**
 - Summary reports will follow after overall report is completed.



Overall Comments (I)

- LBNE research efforts have a strong focus on science, as well as on the application of technical capabilities. This is essential for a sustained involvement in LBNE and justifies support from Lab and DOE management.
- The scope of effort on LBNE at Fermilab and BNL is substantial, and the activities are well identified. The scope of effort at the other labs will continue to evolve as LBNE itself evolves. It will be important to more clearly delineate the roles of the other labs.
- One area of potential concern involves the application of the considerable computing and software development capabilities of the labs. It is essential for the LBNE Project, Science Collaboration, and laboratory management to develop a coherent plan for exploitation of these resources.
- The overall LArTPC R&D effort appears to be un-coordinated, with risks of redundancy and irrelevance of specific efforts. Development and operation of prototype/test beam LArTPC detectors can consume considerable material and personnel resources, and may limit the resources available to make adequate direct progress on LBNE.



Overall Comments (II)

- The experiments searching for charged lepton flavor violation cLFV (Mu2e, COMET, MEG, Mu3e) share many technical challenges and solutions. They should not be considered as independent undertakings, but as one coherent program, scattered around different labs.
- The labs involved in Mu2e should seek potential fields of common interest in the international cLFV community besides the ones already addressed.



Overall Recommendations

- The labs and the LBNE leadership team should work together to coordinate computing and software development effort among the labs participating in LBNE.
- The labs should coordinate the LAr R&D activities in support of LBNE.
- The neutrino experimental community is putting a great deal of ongoing effort and resources into studying neutrino interactions at low energy. Not only are new models needed for the next generation of experiments, but also new generators that simulate final state particles emerging from the interaction vertex in a nuclear environment. The labs should enable interaction with the theory community and make these critical intensity frontier tools a high priority short-term deliverable.



Findings

- ANL played a major role in MINOS and Double Chooz.
- ANL has had significant roles in NOvA and LBNE since their inception.
- They are just beginning their involvement in Muon g-2.
- ANL's proposals for what they will do on their various ongoing efforts are well motivated by the skills of the people they have.

Comments

- They have done a very good job of leveraging the resources of a multi-purpose lab.
- Commend ANL on plan to complete and transition from MINOS and Double Chooz.
- They are stretched quite thin so there are probably no extra resources to devote to other initiatives.

Recommendations

None.